On the Persistence of Homogeneous Matter

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Abstract

Some recent philosophical debate about persistence has focussed on an argument against perdurantism that discusses rotating perfectly homogeneous discs (the `rotating discs argument'; RDA). The argument has been mostly discussed by metaphysicians, though it appeals to ideas from classical mechanics, especially about rotation. In contrast, I assess the RDA from the perspective of the philosophy of physics.

After introducing the argument and emphasizing the relevance of physics (Sections 1 to 3), I review some metaphysicians' replies to the argument, especially those by Callender, Lewis, Robinson and Sider (Section 4). Thereafter, I argue for three main conclusions. They all arise from the fact, emphasized in Section 2, that classical mechanics (non-relativistic as well as relativistic) is both more subtle, and more problematic, than philosophers generally realize.

The first conclusion is that the RDA can be formulated more strongly than is usually recognized: it is not necessary to ``imagine away'' the dynamical effects of rotation (Section 5.5). The second is that in general relativity, the RDA fails because of frame-dragging (Section 5.6).

The third is that even setting aside general relativity, the strong formulation of the RDA can after all be defeated (Section 6 onwards). Namely, by the perdurantist taking objects in classical mechanics (whether point-particles or continuous bodies) to have only temporally extended, i.e. non-instantaneous, temporal parts: which immediately blocks the RDA. Admittedly, this version of perdurantism defines persistence in a weaker sense of `definition' than pointilliste versions that aim to define persistence assuming only instantaneous temporal parts. But I argue that temporally extended temporal parts: (i) can do the jobs within the endurantism-perdurantism debate that the perdurantist wants temporal parts to do; and (ii) are supported by both classical and quantum mechanics

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